



Performance-based Monitoring: A Strategic Imperative

This paper first appeared in Renewable Energy World, Nov 2010

Monitoring 1.0

Traditional monitoring utilized off-the-shelf products that were combined into a system and placed into an enclosure. These products are data gathering devices, web servers, power supplies, etc. and limit the cost structure of those monitoring solutions to price points that do not allow significant market penetration at the residential level.

The California Public Utilities Commission in its rulemaking for the CSI (California Solar Initiative) program about monitoring for residential PV deemed that costs above one percent of the system price were too high, and thus allowed customers to opt out of monitoring for their systems. While some view this as shortsighted and the equivalent of purchasing a car without a speedometer or odometer, others view solar systems as appliances and advocate that they should “just work” and presumably just keep on working. Evidence points to the contrary, however.

Recent public statements by leading solar installers in the PV market point to a 1 in 10 system failure rate within the first year of operation – an “infant mortality rate” that is too high for the emerging solar marketplace. If the analysis is extended to the full 20+ years of expected operation of the PV panels, one can predict with confidence that there will be a 100 percent failure rate of the system due to inverter failure.

While the manufacturers warranty the panels for 20+ years, the average lifespan of inverters remains between 10-12 years. Therefore, over the course of the lifespan of the panels, one can accurately predict with 100 percent certainty that the inverter(s) will fail. If system failure was a more spectacular event, this may not be such a big issue, however the systems tend to fail “quietly” and simply stop working. Therefore it may be several months before the owner of an un-monitored system realizes that something is amiss.

Solar thermal systems suffer a similar fate. Most, if not all, solar water heating systems utilize a “back-up re-heat coil” for those cloudy days when the solar gain is not enough to heat the water adequately. How does one determine if the solar thermal system is operating to its designed capacity without monitoring? A loss of glycol pressurization may cause the system to become inoperable, however the controller will still call for the pump to run, and the pump may indeed run, without circulating any heating medium. The back-up coil continues to heat the water and the system owner continues to take hot showers, even though the system is effectively off.

Enter Monitoring 2.0

The latest wave of monitoring systems, such as the SunReports Apollo1, has taken a fresh look at the requirements for residential monitoring applications. Displaying actual versus estimated performance data via online portals, Monitoring 2.0 solutions place a strong emphasis on both providing system owners with relevant information and providing installers with the data they need to cost-effectively manage their installation portfolio.

Installers are now able to monitor their installations from a remote location, and, utilizing a Google-maps based interface see at-a-glance the status of their entire installed base. Further some systems provide the ability to plot a "predicted performance" line on the graphs for both kWh and BTU, enabling the installer to have tangible evidence of the accuracy of performance predictions.

Since virtually all solar energy systems are sold on an ROI or payback basis to the end user, it seems logical that both the installers and end users would want to know what the payback or ROI actually is. Not knowing this can open up liability down the road if the proposals contain miscalculations or exaggerated performance estimates, or if system performance does not measure up to the proposal's promises.

With Monitoring 2.0, if a system goes offline or deviates from the predicted performance by a user-defined percentage, alarms are dispatched to alert the installer to the performance deviation. As a risk-mitigation strategy – both on the performance vs. the proposal and on the performance vs. warranty – the closed-loop feedback components of such a monitoring system become quite important.

Similar graphical representations of the performance of a solar thermal system are available, with predicted BTU values similarly input by the installer.

By matching the actual system performance to the predicted performance as promised to the customer, the installer is able to offer other value- and revenue-creating services such as performance-based panel cleaning, performance assurance, energy guarantees or the ability to demonstrate PPA performance against an estimate.

Through the use of performance-based monitoring, installers are able to differentiate themselves from their competition, as well offer new services that were not possible before being able to track system performance remotely. It is anticipated that the leading installers will share the predicted vs. actual performance with their customers, to demonstrate that their payback is actually happening as promised. A hidden benefit of monitoring the system is that the installer will now have tangible evidence of system performance issues when dealing with inverter or panel manufacturers on warranty claims, something that can't be done without a monitoring system in place.

The sales "sizzle" that monitoring provides will enable system owners to share performance data with their friends, or in the case of small commercial customers, with their patrons by way of public displays showcasing green benefits of their solar installations. Already upscale health club facilities, laundromats and car washes are doing this.

With monitoring costs now at or below the one percent range of PV system prices, it is anticipated that end users will opt for monitoring, particularly when installers demonstrate their use and the monitoring system's benefits. Installers will no doubt begin to offer performance-based options that will enable them to capture more value for each sale by being able to extract additional revenue, and profit, from each customer. Further, it is anticipated that new service offerings as mentioned above will enable the installer to capture additional gross margin dollars from each customer, and spread the increased margin capture across their 10-year warranty obligations.

Thomas Dinkel is the CEO of SunReports, Inc, and has many years in the renewable energy business, holding leadership positions with companies such as Johnson Controls, Honeywell, Cupertino Electric, Whisper Communications, and Fat Spaniel Technologies. His experience working with both large and small companies helps provide a basis for understanding the needs of the installer as well as the needs of the end user. His passion is creating innovative, high value products, culminating in outstanding customer satisfaction and "knock your socks off" customer experiences.

creasingly competitive marketplace, installers must find ways to either keep up with their